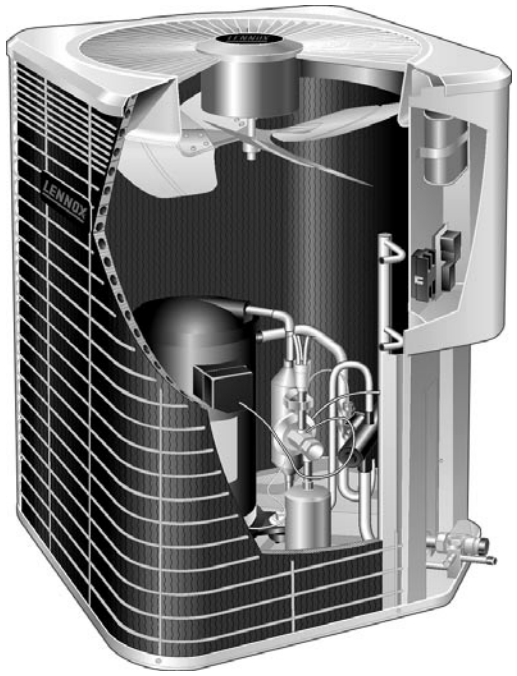
HPXA12 SERIES UNITS

The HPXA12 is a high efficiency residential split-system heat pump unit, which features a scroll compressor and R410A refrigerant. HPXA12 units are available in sizes ranging from 1 1/2 through 5 tons. The series is designed for use with an expansion valve only (approved for use with R410A) in the indoor unit.This manual is divided into sections which discuss the major components, refrigerant system, charging procedure, maintenance and operation sequence.

Information contained in this manual is intended for use by qualified service technicians only. All specifications are subject to change.



⚠ IMPORTANT

Operating pressures of this R410A unit are higher than pressures in R22 units. Always use service equipment rated for R410A.

⚠ WARNING

Warranty will be voided if covered equipment is removed from original installation site. Warranty will not cover damage or defect resulting from: Flood, wind, lightning, or installation and operation in a corrosive atmosphere (chlorine, fluorine, salt, recycled waste water, urine, fertilizers, or other damaging chemicals).

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer or service agency.

⚠ WARNING

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

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SPECIFICATIONS single phase

General Data		Model No.	HPXA12-018	HPXA12-024	HPXA12-030	HPXA12-036
		Nominal Tonnage (kW)	1.5 (5.3)	2 (7.0)	2.5 (8.8)	3 (10.6)
Connections (sweat)		Liquid line o.d. - in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
		Vapor line o.d. - in. (mm)	3/4 (19.1)	3/4 (19.1)	3/4 (19.1)	7/8 (22.2)
⁘**Refrigerant (R410A) furnished**			7 lbs. 5 oz. (3.31 kg)	6 lbs. 12 oz. (3.06 kg)	7 lbs. 12 oz. (3.51 kg)	8 lbs. 15 oz. (4.1 kg)
Outdoor Coil Fan		Diameter - in. (mm) & no. of blades	18 (457) - 3	18 (457) - 3	18 (457) - 4	18 (457) - 4
		Motor hp (W)	1/6 (124)	1/6 (124)	1/6 (124)	1/6 (124)
		Cfm (L/s)	2500 (1180)	2500 (1180)	2450 (1155)	2450 (1155)
		Rpm	1100	1100	1100	1100
		Watts	200	200	200	200
Outdoor Coil	Net face area sq. ft. (m^2)	Outer coil	15.21 (1.41)	15.21 (1.41)	15.21 (1.41)	15.21 (1.41)
		Inner coil	5.44 (0.51)	5.44 (0.51)	14.50 (1.35)	14.50 (1.35)
		Tube diameter - in. (mm) & no. of rows	5/16 (8) - 1.37	5/16 (8) - 1.37	5/16 (8) - 2	5/16 (8) - 2
		Fins per inch (m)	18 (709)	18 (709)	18 (709)	18 (709)
Shipping Data		lbs. (kg) 1 package	160 (73)	160 (73)	176 (80)	181 (82)
OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA						
Compressor Monitor (Canada Only)			**45F08**	**45F08**	**45F08**	**45F08**
Hail Guards			**17L73**	**17L73**	**17L73**	**17L73**
Mild Ambient Kit (LB-101122)			**32M08**	**32M08**	**32M08**	**32M08**
Monitor Kit (Canada Only)			**76F53**	**76F53**	**76F53**	**76F53**
Outdoor Thermostat Kit		Thermostat	**56A87**	**56A87**	**56A87**	**56A87**
		Mounting Box - US	**31461**	**31461**	**31461**	**31461**
		Canada	**33A29**	**33A29**	**33A29**	**33A29**
Plastic Mounting Base		Part No. - Catalog Number	MB2-S **(69J06)**	MB2-S **(69J06)**	MB2-S **(69J06)**	MB2-S **(69J06)**
		Net Weight	6 lbs. (3 kg)	6 lbs. (3 kg)	6 lbs. (3 kg)	6 lbs. (3 kg)
Refrigerant Line Set		30 ft. (9 m) length	L15-41-30	L15-41-30	L15-41-30	L15-65-30
		40 ft. (12 m) length	L15-41-40	L15-41-40	L15-41-40	L15-65-40
		50 ft. (15 m) length	L15-41-50	L15-41-50	L15-41-50	L15-65-50
		Suction/Vapor Line o.d. - in. (mm)	3/4 (19)	3/4 (19)	3/4 (19)	7/8 (22.2)
		Liquid Line o.d. - in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Unit Stand-Off Kit			**94J45**	**94J45**	**94J45**	**94J45**

†Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
⁘Refrigerant charge is sufficient for 15 ft. (4.5 m) length line set.
NOTE - Extremes of operating range are plus 10% and minus 5% of line voltage

SPECIFICATIONS single phase Cont.

General Data	Model No.	HPXA12-042	HPXA12-048	HPXA12-060
	Nominal Tonnage (kW)	3.5 (12.3)	4 (14.1)	5 (17.6)
Connections (sweat)	Liquid line o.d. - in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Vapor line o.d. - in. (mm)	7/8 (22.2)	7/8 (22.2)	1-1/8 (28.6)
⁘**Refrigerant (R410A) furnished**		9 lb. 2 oz. (4.13 kg)	11 lbs. 5 oz. (5.12 kg)	11 lbs. 3 oz. (5.06 kg)
Outdoor Coil Fan	Diameter - in. (mm) & no. of blades	18 (457) - 4	22 (559) - 4	22 (559) - 4
	Motor hp (W)	1/3 (249)	1/3 (249)	1/3 (249)
	Cfm (L/s)	2930 (1385)	3890 (1835)	3890 (1835)
	Rpm	1100	1085	1085
	Watts	310	375	375
Outdoor Coil	Net face area sq. ft. (m^2) Outer coil	15.21 (1.41)	21.11 (1.96)	21.11 (1.96)
	Net face area sq. ft. (m^2) Inner coil	14.50 (1.35)	20.31 (1.89)	20.31 (1.89)
	Tube diameter - in. (mm) & no. of rows	5/16 (8) - 2	5/16 (8) - 2	5/16 (8) - 2
	Fins per inch (m)	22 (860)	22 (860)	22 (860)
Shipping Data	lbs. (kg) 1 package	190 (86)	244 (111)	244 (111)
OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA				
Compressor Monitor (Canada Only)		**45F08**	**45F08**	**45F08**
Hail Guards		**17L73**	**17L74**	**17L74**
Mild Ambient Kit (LB-101122)		**32M08**	**32M08**	**32M08**
Monitor Kit (Canada Only)		**76F53**	**76F53**	**76F53**
Outdoor Thermostat Kit	Thermostat	**56A87**	**56A87**	**56A87**
	Mounting Box - US	**31461**	**31461**	**31461**
	Canada	**33A29**	**33A29**	**33A29**
Plastic Mounting Base	Part No. - Catalog Number	MB2-S **(69J06)**	MB2-L **(69J07)**	MB2-L **(69J07)**
	Net Weight	6 lbs. (3 kg)	15 lbs. (7 kg)	15 lbs. (7 kg)
Refrigerant Line Set	30 ft. (9 m) length	L15-65-30	L15-65-30	Field Fabricate
	40 ft. (12 m) length	L15-65-40	L15-65-40	Field Fabricate
	50 ft. (15 m) length	L15-65-50	L15-65-50	Field Fabricate
	Suction/Vapor Line o.d. - in. (mm)	7/8 (22.2)	7/8 (22.2)	1-1/8 (28.5)
	Liquid Line o.d. - in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
Unit Stand-Off Kit		**94J45**	**94J45**	**94J45**

†Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
⁘Refrigerant charge is sufficient for 20 ft. (6.1 m) length line set.
NOTE - Extremes of operating range are plus 10% and minus 5% of line voltage

ELECTRICAL DATA

Model No.		HPXA12-018	HPXA12-024	HPXA12-030	HPXA12-036	HPXA12-042	HPXA12-048	HPXA12-060
Line voltage data - 60 hz - 1 phase		208/230v	208/230v	208/230v	208/230v	208/230v	208/230v	208/230v
Recommended maximum fuse or circuit breaker size (amps)		20	30	35	35	45	50	60
†**Minimum circuit ampacity**		14.0	18.0	20.0	20.4	25.9	30.8	36.4
Compressor	Rated load amps	10.3	13.5	15.1	15.4	19.2	23.1	27.6
	Power factor	.98	.98	.98	.98	.99	.99	.99
	Locked rotor amps	51	61	72.5	83	104	134	158
Outdoor Coil Fan Motor	Full load amps	1.1	1.1	1.1	1.1	1.9	1.9	1.9
	Locked rotor amps	1.9	1.9	1.9	1.9	4.1	4.1	4.1

†Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.
NOTE — Extremes of operating range are plus 10% and minus 5% of line voltage.

SPECIFICATIONS three phase

General Data		Model No.	HPXA12-036		HPXA12-048		HPXA12-060	
		Nominal Tonnage (kW)	3 (10.6)		4 (14.1)		5 (17.6)	
Connections (sweat)		Liquid line o.d. - in. (mm)	3/8 (9.5)		3/8 (9.5)		3/8 (9.5)	
		Vapor line o.d. - in. (mm)	7/8 (22.2)		7/8 (22.2)		1-1/8 (28.6)	
[1] Refrigerant (R410A) furnished			8 lbs. 15 oz. (4.1 kg)		11 lbs. 5 oz. (5.1 kg)		11 lbs. 3 oz. (5.1 kg)	
Outdoor Coil Fan		Diameter - in. (mm) & no. of blades	18 (457) - 4		22 (559) - 4		22 (559) - 4	
		Motor hp (W)	1/6 (124)		1/3 (249)		1/3 (249)	
		Cfm (L/s)	2450 (1155)		3890 (1835)		3890 (1835)	
		Rpm	1100		1085		1085	
		Watts	200		375		375	
Outdoor Coil	Net face area sq. ft. (m^2)	Outer coil	15.21 (1.41)		21.11 (1.96)		21.11 (1.96)	
		Inner coil	14.50 (1.35)		20.31 (1.89)		20.31 (1.89)	
		Tube diameter - in. (mm) & no. of rows	5/16 (8) - 2		5/16 (8) - 2		5/16 (8) - 2	
		Fins per inch (m)	18 (709)		22 (860)		22 (860)	
Shipping Data		1 package - lbs. (kg)	181 (82)		244 (111)		244 (111)	

ELECTRICAL DATA

		Model No.	HPXA12-036 -233	HPXA12-036 -463	HPXA12-048 -233	HPXA12-048 -463	HPXA12-060 -233	HPXA12-060 -463
		Line voltage data - 60 hz - 3 phase	208/230V	460V	208/230V	460V	208/230V	460V
		[2] Maximum overcurrent protection (amps)	25	10	35	15	40	20
		[3] Minimum circuit ampacity	15.4	6.9	21.9	9.8	24.5	12.2
	Compressor	Rated load amps	11.5	5.1	16	7.1	18.1	9
		Locked Rotor amps	77	35	91	46	137	62
		Power Factor	.98	.98	.99	.99	.99	.99
	Outdoor Coil Fan Motor	Full load amps	1	.55	1.9	.9	1.9	.9
		Locked Rotor Amps	2.3	1	4.1	2.1	4.1	2.1

OPTIONAL ACCESSORIES - MUST BE ORDERED EXTRA

Compressor Low Ambient Cut-Off		**45F08**	**45F08**	**45F08**	
Compressor Sound Cover		**69J03**	**69J03**	**69J03**	
Compressor Crankcase Heater		**67K90**	**67K89**	Factory Installed	Factory Installed
Freezestat	3/8 in. tubing	**93G35**		**93G35**	**93G35**
	1/2 in. tubing	**39H29**		**39H29**	**39H29**
	5/8 in. tubing	**50A93**		**50A93**	**50A93**
Hail Guards		**17L73**		**17L74**	**17L74**
Low Ambient Kit		**54M89**		**54M89**	**54M89**
Mild Weather Kit		**33M07**		**33M07**	**33M07**
Monitor Kit - Service Light		**76F53**		**76F53**	**76F53**
Outdoor Thermostat Kit	Thermostat	**56A87**		**56A87**	**56A87**
	Mounting Box - US	**31461**		**31461**	**31461**
	Canada	**33A09**		**33A09**	**33A09**
Mounting Base	Model (Catalog) No.	MB2-S **(69J06)**		MB2-L **(69J07)**	MB2-L **(69J07)**
	Net Weight	6 lbs. (3 kg)		15 lbs. (7 kg)	15 lbs. (7 kg)
Refrigerant Line Set	15 ft. (4.6 m) length	L15-65-15		L15-65-15	Field Fabricate
	30 ft. (9 m) length	L15-65-30		L15-65-30	Field Fabricate
	40 ft. (12 m) length	L15-65-40		L15-65-40	Field Fabricate
	50 ft. (15 m) length	L15-65-50		L15-65-50	Field Fabricate
Unit Stand-Off Kit		**94J45**		**94J45**	**94J45**

NOTE - Extremes of operating range are plus 10% and minus 5% of line voltage.

1 Refrigerant charge is sufficient for 15 ft. (4.6 m) length line set.

2 HACR tyoe circuit breaker or fuse.

3 Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements.

I - UNIT INFORMATION

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions during unit installation and service to protect the unit's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the unit, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface before performing any service procedure.

All major components (indoor blower and coil) must be matched according to Lennox recommendations for the compressor to be covered under warranty. Refer to the Engineering Handbook for approved system matchups. A missapplied system will cause erratic operation and can result in early compressor failure.

⚠ IMPORTANT

This unit must be matched with an indoor coil as specified in Lennox' Engineering Handbook.

II - UNIT COMPONENTS

Unit components are illustrated in figure 1.

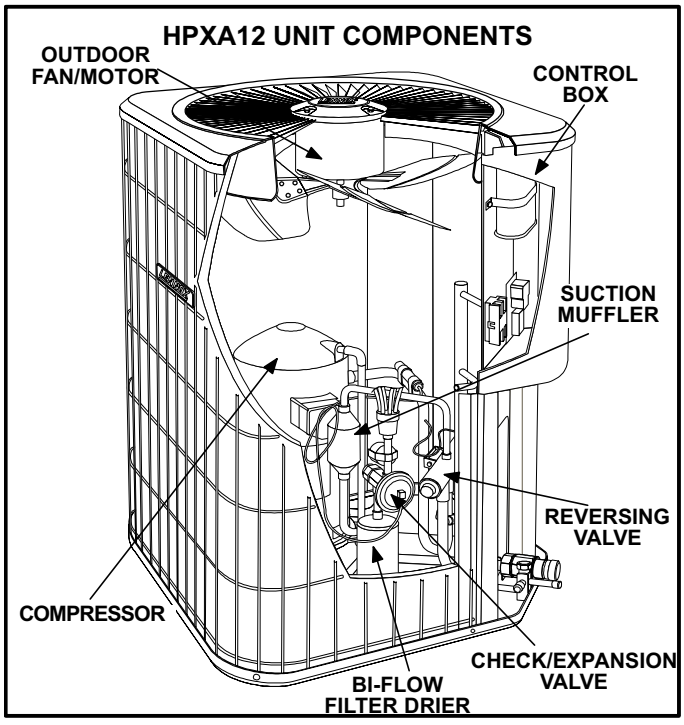


FIGURE 1

A - Control Box (Figures 2 and 3)

HPXA12 units are not equipped with a 24V transformer. All 24 VAC controls are powered by the indoor unit. Refer to wiring diagram.

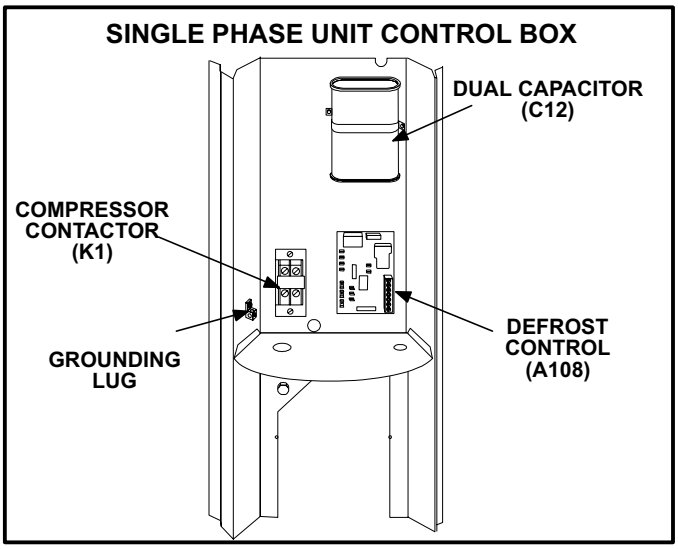


FIGURE 2

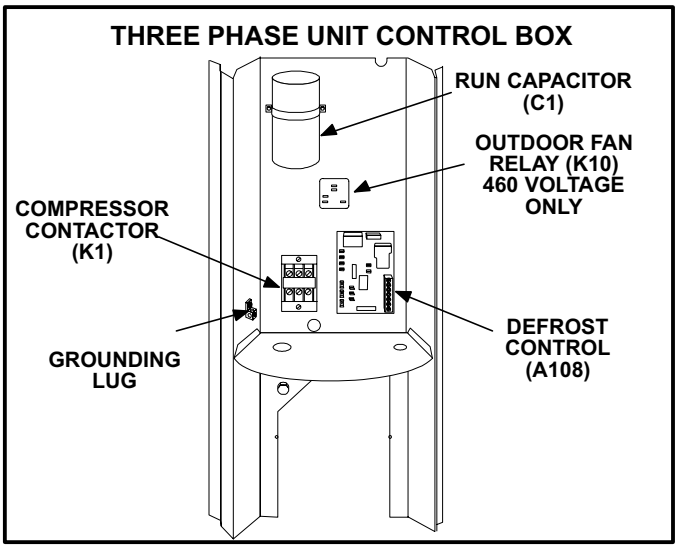


FIGURE 3

Electrical openings are provided under the control box cover. Field thermostat wiring is made to a 24V terminal strip located on the defrost control board located in the control box. See figure 4.

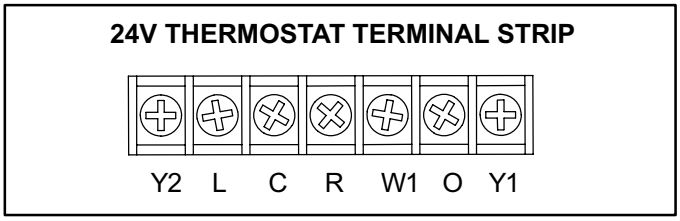


FIGURE 4

1 - Compressor Contactor K1

The compressor is energized by a contactor located in the control box. See figure 2. Single-pole contactors are used in single-phase HPXA12 series units and three pole contactors are used in HPXA12 three-phase units. K1 is energized through the control board by the indoor thermostat terminal Y1 (24V) when thermostat demand is present.

⚠ DANGER

Electric Shock Hazard.
May cause injury or death.
Line voltage is present at all components when unit is not in operation on units with single pole contactors.
Disconnect all remote electrical power supplies before opening unit panel.
Unit may have multiple power supplies.

2 - Outdoor Fan Relay K10 (460V units only)

Outdoor fan relay K10, used in 460V units only, is a SPST normally open relay. K10 is energized by contactor K1 which in turn energizes outdoor fan B4 in response to thermostat demand.

3 - Run Capacitor C1 (three phase only)

The fan in all three-phase units uses a single-phase permanent split capacitor motor. A single capacitor C1 is used for the fan motor. C1 is located inside the control box. See figure 3. Fan motor nameplate will have capacitor ratings.

4 - Dual Capacitor C12

The compressor and fan in single phase HPXA12 series units use permanent split capacitor motors. The capacitor is located inside the unit control box (see figure 2). A single "dual" capacitor (C12) is used for both the fan motor and the compressor (see unit wiring diagram). The fan side and the compressor side of the capacitor have different MFD ratings. See side of capacitor for ratings.

5 - Demand Defrost System

Boards 60L3901, 46M8201, 56M8501

The HPXA12 will be equipped with one of three model defrost boards. Differences are minimal:

- Three strike lock out feature (60L3901)
- Five strike out feature (46M8201, 56M8501)
- Terminal "T" for ambient sensor (60L3901)
- Terminal "Y2" for 2nd stage thermostat input (46M8201, 56M8501).
- "DELAY" pins (56M8501)

The demand defrost board uses basic differential temperature means to detect degradation of system performance due to ice build-up on the outdoor coil. Further, the controller uses "self-calibrating" principles to calibrate itself when the system starts and after each time the system defrosts. The control board has defrost relays, anti-short cycle timed-off control, pressure switch/safety control, 3-strike lockout circuit, field test pins, ambient and coil temperature sensors, field selectable termination temperature and a field low voltage connection terminal strip.

The control monitors ambient temperature, outdoor coil temperature and total run time to determine when a defrost cycle is required. Two temperature probes are permanently attached to the control. The coil temperature probe is designed with a spring clip to allow mounting to the outside coil tubing. The location of the coil sensor is important for proper defrost operation. On HPXA12-018 & -024 the sensor should located on the 4th hairpin bend from the bottom. HPXA12-030 through -060 units the sensor should located on the 6th hairpin bend from the bottom. See figure 5.

NOTE - The logic of the Demand Defrost Board provides accurate performance measurements of the system as FROST accumulates on the outdoor coil. This will translate into longer running time in the heating mode with FROST accumulations on the outdoor coil before the board initiates any defrost cycles.

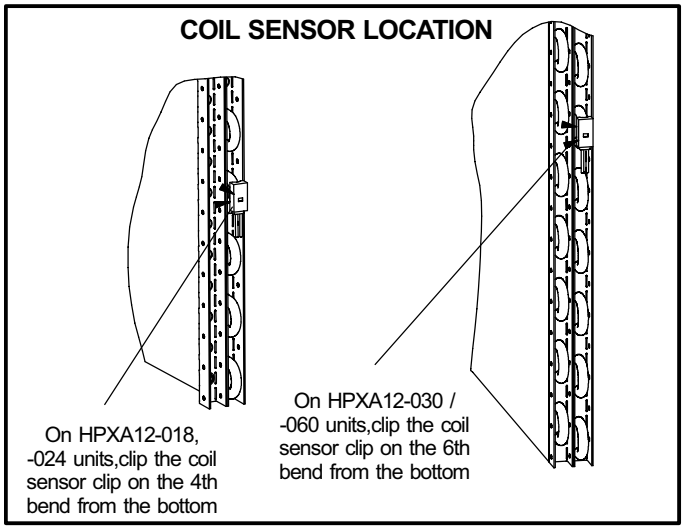


FIGURE 5

The temperature probes cannot be detached from the control. The control and the attached probes MUST be replaced as a unit. Do not attempt to cut or splice probe wires.

Diagnostic LEDs

The defrost board uses two LEDs for diagnostics. The LEDs flash a specific sequence according to the condition. See table 1.

HI-PS/LO-PS Terminals

High pressure switch (S4) is factory wired into the defrost board HI-PS terminals. When (S4) trips, the defrost board will cycle off the compressor and the strike counter in the board will count one strike.

Low pressure switch (S87) is factory wired into the defrost board LO-PS terminals. When (S87) trips, the defrost board will cycle off the compressor and the strike counter in the board will count one strike.
(S87) is ignored during certain conditions:

- During the defrost cycle and 90 seconds after the termination of defrost
- When the average ambient sensor temperature is below 15 F (-9)
- For 90 seconds following the start up of the compressor
- During ”Test” mode

3-Strike Lockout Feature (Board 60L3901)

- The internal control logic of the board counts the pressure switch trips only while the Y1 (Input) line is active. If a pressure switch opens and closes twice during a Y1 (Input), the control logic will reset the pressure switch trip counter to zero at the end of the Y1 (Input). If the pressure switch opens for a third time during the current Y1 (Input), the control will enter a lockout condition.
- The 3-strike pressure switch lockout condition can be reset by cycling OFF the 24-volt power supply to the control board or by shorting the TEST pins. All timer functions (run times) will also be reset.
- If a pressure switch becomes open while the Y1 Out line is engaged, a 5 minute short cycle will occur after the switch closes.

5-Strike Lockout Feature (Boards 46M8201, 56M8501)

- The internal control logic of the board counts the pressure switch trips only while the Y1 (Input) line is active. If a pressure switch opens and closes 4 times during a Y1 (Input), the control logic will reset the pressure switch trip counter to zero at the end of the Y1 (Input). If the pressure switch opens for a fifth time during the current Y1 (Input), the control will enter a lockout condition.
- The 5-strike pressure switch lockout condition can be reset by cycling OFF the 24-volt power supply to the control board or by shorting the TEST pins. All timer functions (run times) will also be reset.
- If a pressure switch becomes open while the Y1 Out line is engaged, a 5 minute short cycle will occur after the switch closes.

Operational Description

The demand defrost board has three basic operational modes: Normal, Defrost, and Calibration.

Normal Mode

The demand defrost board monitors the “O” line, to determine the system operating mode (heat/cool), outdoor ambient temperature, coil temperature (outdoor coil) and compressor run time to determine when a defrost cycle is required.

Defrost Mode

When a defrost cycle is initiated, the control energizes the reversing valve solenoid and turns off the condenser fan. The control will also put 24VAC on the “W1” (auxiliary heat) line. The unit will stay in this mode until either the coil sensor temperature is above the selected termination temperature, the defrost time of 14 minutes has been completed, or the room thermostat demand cycle has been satisfied. (If the temperature select shunt is not installed, the default termination temperature will be 100°F.) If the room thermostat demand cycle terminates the cycle, the defrost cycle will be held until the next room thermostat demand cycle. If the coil sensor temperature is still below the selected termination temperature, the control will continue the defrost cycle until the cycle is terminated in one of the methods mentioned above. If a defrost is terminated by time and the coil temperature did not remain above 35°F (2°C) for 4 minutes, the control will go to the 34-minute Time/Temperature mode.

“DELAY” PINS

The 56M8501 defrost board has a field selectable function to reduce occasional noise that may occur while the unit is cycling in and out of defrost mode. When a jumper is installed on the “DELAY” pins, the compressor will cycle off for 30 seconds going in and out of defrost mode. Units are shipped with jumper installed on “DELAY” pins.

NOTE - 30 second off cycle is not functional when jumpering “TEST” pins.

Calibration Mode

The board is considered uncalibrated when power is applied to the board, after cool mode operation, or if the coil temperature exceeds the termination temperature when it is in heat mode. Calibration of the board occurs after a defrost cycle to ensure that there is no ice on the coil. During calibration, the temperature of both the coil and the ambient sensor are measured to establish a temperature differential required to allow a defrost cycle.

Demand Defrost Operation

The demand defrost control board initiates a defrost cycle based on either frost detection or time.

Frost Detection - If the compressor runs longer than 34 minutes and the actual difference between the clear coil and frosted coil temperatures exceeds the maximum difference allowed by the control, a defrost cycle will be initiated. *IMPORTANT - The demand defrost control board will allow a greater accumulation of frost and will initiate fewer defrost cycles than a time/temperature defrost system.*

Time - If 6 hours of heating mode compressor run time has elapsed since the last defrost cycle while the coil temperature remains below 35°F (2°C), the demand defrost control will initiate a defrost cycle.

Actuation - When the reversing valve is de-energized, the Y1 circuit is energized, and the coil temperature is below 35°F (2°C), the board logs the compressor run time. If the board is not calibrated, a defrost cycle will be initiated after 34 minutes of heating mode compressor run time. The control will attempt to self-calibrate after this (and all other) defrost cycle(s). Calibration success depends on stable system temperatures during the 20-minute calibration period. If the board fails to calibrate, another defrost cycle will be initiated after 90 minutes of heating mode compressor run time. Once the defrost board is calibrated, it will use demand defrost logic to initiate a defrost cycle. A demand defrost system initiates defrost when the difference between the clear coil and frosted coil temperatures exceeds the maximum difference allowed by the control OR after 6 hours of heating mode compressor run time has been logged since the last defrost cycle.

Termination - The defrost cycle ends when the coil temperature exceeds the termination temperature or after 14 minutes of defrost operation. If the defrost is terminated by the 14-minute timer, another defrost cycle will be initiated after 34 minutes of run time.

Test Mode - When Y1 is energized and 24V power is being applied to the board, a test cycle can be initiated by placing the termination temperature jumper across the “Test” pins for 2 to 5 seconds. If the jumper remains across the “Test” pins longer than 5 seconds, the control will ignore the test pins and revert to normal operation. The jumper will initiate one cycle per test.

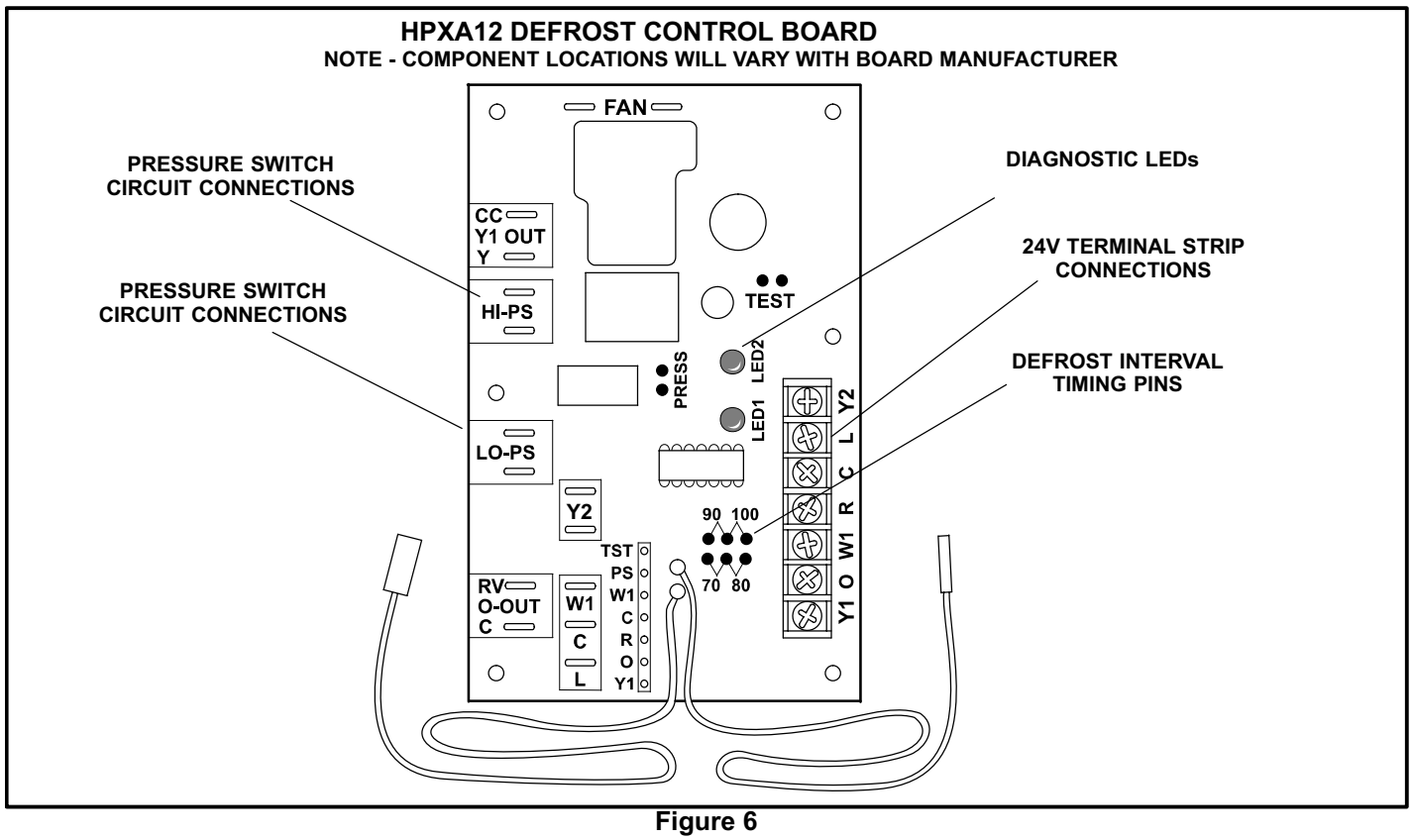


Figure 6

Table 1
Defrost Control Board Diagnostic Led

LED 1	LED 2	Condition	Possible Cause(s)	Solution
OFF	OFF	Power problem	[1] No power (24V) to board terminals R & C. [2] Board failure.	[1] Check control transformer power (24V). [2] If power is available and LED(s) are unlit, replace board and all sensors.
ON	ON	Coil sensor problem	[1] Coil temperature outside of sensor range. [2] Faulty sensor wiring connections at board or poor sensor contact on coil. [3] Sensor failure.	[1] Sensor function will resume when coil temperature is between -20°F and 110°F. [2] Check sensor wiring connections at board and sensor contact on coil. [3] Replace board and all sensors.
OFF	ON	Ambient sensor problem	[1] Ambient temperature outside of sensor range. [2] Faulty sensor wiring connections at board or sensor. [3] Sensor failure.	[1] Sensor function will resume when coil temperature is between -20°F and 110°F. [2] Check sensor wiring connections at board and sensor. [3] Replace board and all sensors.
FLASH	FLASH	Normal operation	Unit operating normally or in standby mode.	None required.
ON	OFF	Strike Out pressure lockout (Short test pins or reset 24V power to board to override lockout)	[1] Restricted air flow over indoor or outdoor coil. [2] Improper refrigerant charge. [3] Improper metering device operation. [4] Poor contact between coil sensor and coil.	[1] Remove any blockages or restrictions. Check outdoor fan motor for proper operation. [2] Check approach, superheat & subcooling temperatures. [3] Check system pressures. Repair leaks. Replace metering device. [4] Make sure that sensor is properly positioned on coil and that firm contact is established. Refer to service manual for proper placement.
ON	FLASH	Low pressure switch circuit open during Y1 demand		
FLASH	ON	High pressure switch circuit open during Y1 demand		
ALTERNATING FLASH	ALTERNATING FLASH	5-minute delay (Jumper test pins to override delay)	Thermostat demand for cooling or heat pump operation. Unit operating in 5-minute anti-short-cycle mode.	None required.

B - Compressor

The scroll compressors in all HPXA12 model units are designed for use with R410A refrigerant and operation at high pressures. Compressors are shipped from the factory with 3MA (32MMMA) P.O.E. oil. See electrical section in this manual for compressor specifications.

The scroll compressor design is simple, efficient and requires few moving parts. A cutaway diagram of the scroll compressor is shown in figure 7. The scrolls are located in the top of the compressor can and the motor is located just below. The oil level is immediately below the motor.

The scroll is a simple compression concept centered around the unique spiral shape of the scroll and its inherent properties. Figure 8 shows the basic scroll form. Two identical scrolls are mated together forming concentric spiral shapes (figure 9). One scroll remains stationary, while the other is allowed to "orbit" (figure 10). Note that the orbiting scroll does not rotate or turn but merely orbits the stationary scroll.

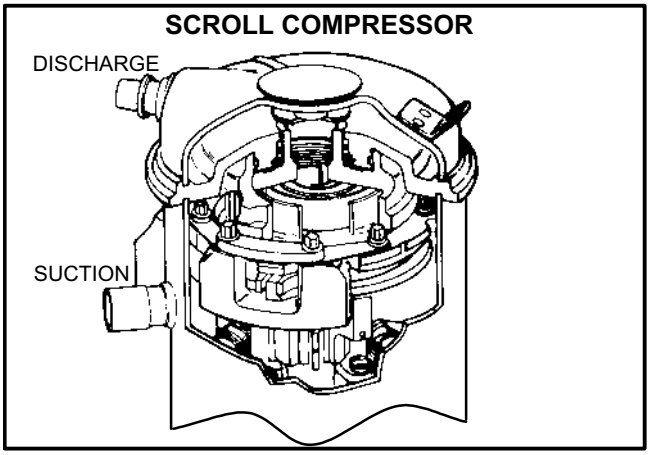


FIGURE 7

NOTE - During operation, the head of a scroll compressor may be hot since it is in constant contact with discharge gas.

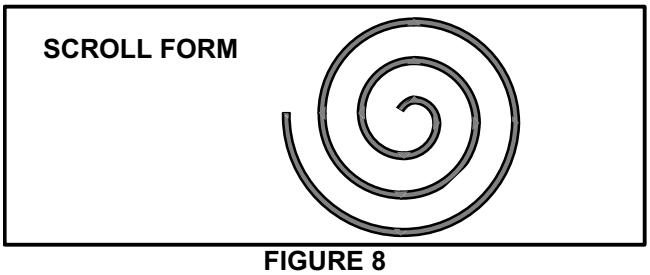


FIGURE 8

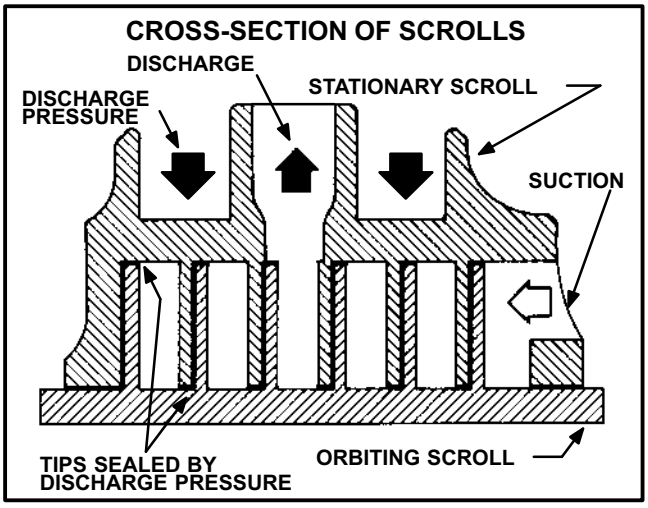


FIGURE 9

The counterclockwise orbiting scroll draws gas into the outer crescent shaped gas pocket created by the two scrolls (figure 10 - 1). The centrifugal action of the orbiting scroll seals off the flanks of the scrolls (figure 10 - 2). As the orbiting motion continues, the gas is forced toward the center of the scroll and the gas pocket becomes compressed (figure 10 - 3). When the compressed gas reaches the center, it is discharged vertically into a chamber and discharge port in the top of the compressor (figure 9). The discharge pressure forcing down on the top scroll helps seal off the upper and lower edges (tips) of the scrolls (figure 9). During a single orbit, several pockets of gas are compressed simultaneously providing smooth continuous compression.

The scroll compressor is tolerant to the effects of liquid return. If liquid enters the scrolls, the orbiting scroll is allowed to separate from the stationary scroll. The liquid is worked toward the center of the scroll and is discharged. If the compressor is replaced, conventional Lennox cleanup practices must be used.

Due to its efficiency, the scroll compressor is capable of drawing a much deeper vacuum than reciprocating compressors. Deep vacuum operation can cause internal fusite arcing resulting in damaged internal parts and will result in compressor failure. Never use a scroll compressor for evacuating or "pumping-down" the system. This type of damage can be detected and will result in denial of warranty claims.

The scroll compressor is quieter than a reciprocating compressor, however, the two compressors have much different sound characteristics. The sounds made by a scroll compressor do not affect system reliability, performance, or indicate damage.

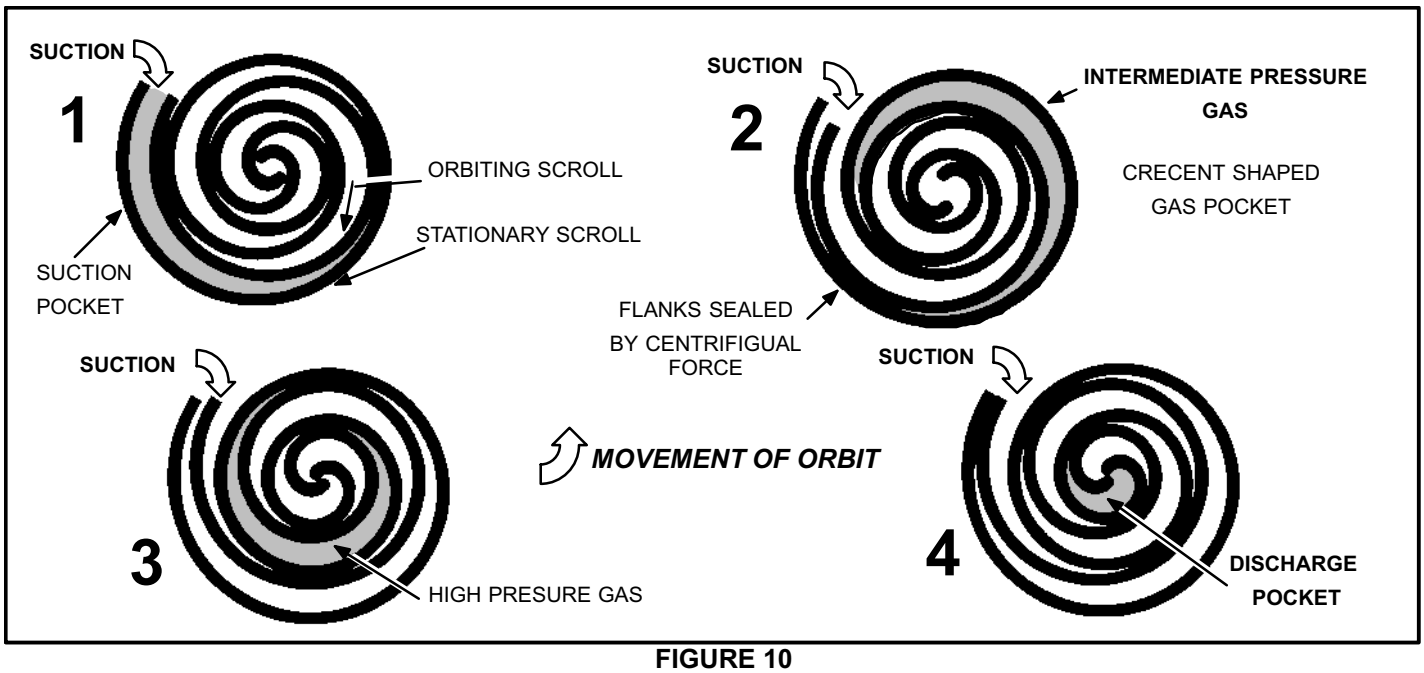


FIGURE 10

Three-Phase Compressor Rotation

Three-phase scroll compressors must be phased sequentially to ensure correct compressor rotation and operation. At compressor start-up, a rise in discharge and drop in suction pressures indicates proper compressor phasing and operation. If discharge and suction pressures do not perform normally, follow the steps below to correctly phase the unit.

1 - Disconnect power to the unit.
2 - Reverse any two field power leads to the unit.
3 - Reapply power to the unit.

Discharge and suction pressures should operate within their normal start-up ranges.

NOTE - Compressor noise level may be significantly higher when phasing is incorrect and the unit will not provide cooling when compressor is operating backwards. Continued backward operation will cause the compressor to cycle on internal protector.

C - Outdoor Fan Motor

All units use single-phase PSC fan motors which require a run capacitor. In all units, the condenser fan is controlled by the compressor contactor.

ELECTRICAL DATA tables in this manual show specifications for condenser fans used in HPXA12s.

Access to the condenser fan motor on all units is gained by removing the seven screws securing the fan assembly. See figure 11. The condenser fan motor is removed from the fan guard by removing the four nuts found on the top panel. If condenser fan motor must be replaced, align fan hub flush with motor shaft. Drip loops should be used in wiring when servicing motor.

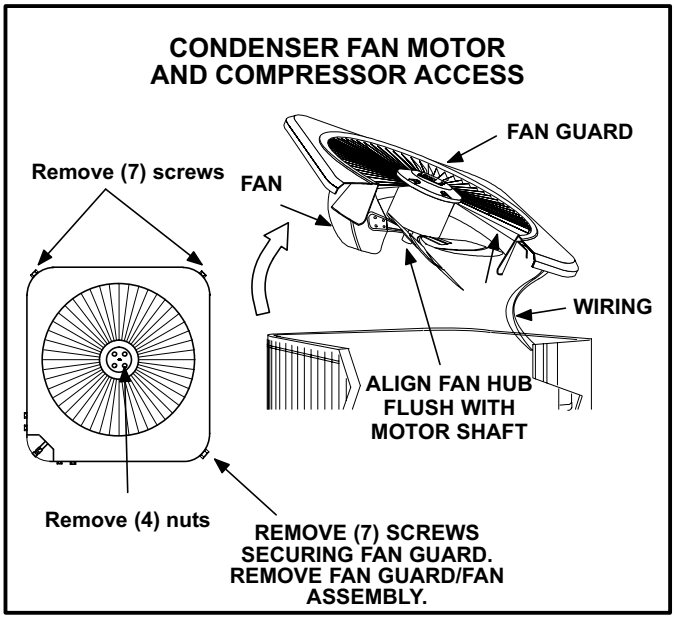


FIGURE 11

D - Reversing Valve L1 and Solenoid

A refrigerant reversing valve with electromechanical solenoid is used to reverse refrigerant flow during unit operation. The reversing valve requires no maintenance. It is not repairable. If the reversing valve has failed, it must be replaced.

If replacement is necessary, access reversing valve by removing the outdoor fan motor. Refer to figure 11.

E - Crankcase Heater HR1

An insertion type crankcase heater is factory installed on HPXA12-048 and -060 three phase units only. The heater is temperature actuatedated and operates only when required.

F - Drier

A filter drier designed for all HPXA12 model units is factory installed in the liquid line. The filter drier is designed to remove moisture and foreign matter, which can lead to compressor failure.

Moisture and / or Acid Check

Because POE oils absorb moisture, the dryness of the system must be verified any time the refrigerant system is exposed to open air. A **c**ompressor oil sample must be taken to determine if excessive moisture has been introduced to the oil. Table 2 lists kits available from Lennox to check POE oils.

If oil sample taken from a system that has been exposed to open air does not test in the dry color range, the filter drier MUST be replace.

⚠ IMPORTANT

Replacement filter drier MUST be approved for R410A refrigerant and POE application.

Foreign Matter Check

It is recommended that a liquid line filter drier be replaced when the pressure drop across the filter drier is greater than 4 psig.

G - High/Low Pressure Switch

⚠ IMPORTANT

Pressure switch settings for R410A refrigerant will be significantly higher than units with R22.

An auto-reset, single-pole/single-throw high pressure switch is located in the liquid line. This switch shuts off the compressor when liquid line pressure rises above the factory setting. The switch is normally closed and is permanently adjusted to trip (open) at 640 ± 10 psi.

An auto-reset, single-pole/single-throw low pressure switch is located in the suction line. This switch shuts off the compressor when suction pressure drops below the factory setting. The switch is closed during normal operating pressure conditions and is permanently adjusted to trip (open) at 25 ± 5 psi. The switch automatically resets when suction line pressure rises above 60 ± 5 psi.

TABLE 2

KIT	CONTENTS	TUBE SHELF LIFE
10N46 - Refrigerant Analysis	Checkmate-RT700	
10N45 - Acid Test Tubes	Checkmate-RT750A (three pack)	2 - 3 years @ room temperature. 3+ years refrigerated
10N44 - Moisture Test Tubes	Checkmate - RT751 Tubes (three pack)	6 - 12 months @ room temperature. 2 years refrigerated
74N40 - Easy Oil Test Tubes	Checkmate - RT752C Tubes (three pack)	2 - 3 years @ room temperature. 3+ years refrigerated
74N39 - Acid Test Kit	Sporian One Shot - TA-1	

III - REFRIGERANT SYSTEM

Refer to figure 12 and 13 for refrigerant flow in the heating and cooling modes. The reversing valve is energized during cooling demand and during defrost.

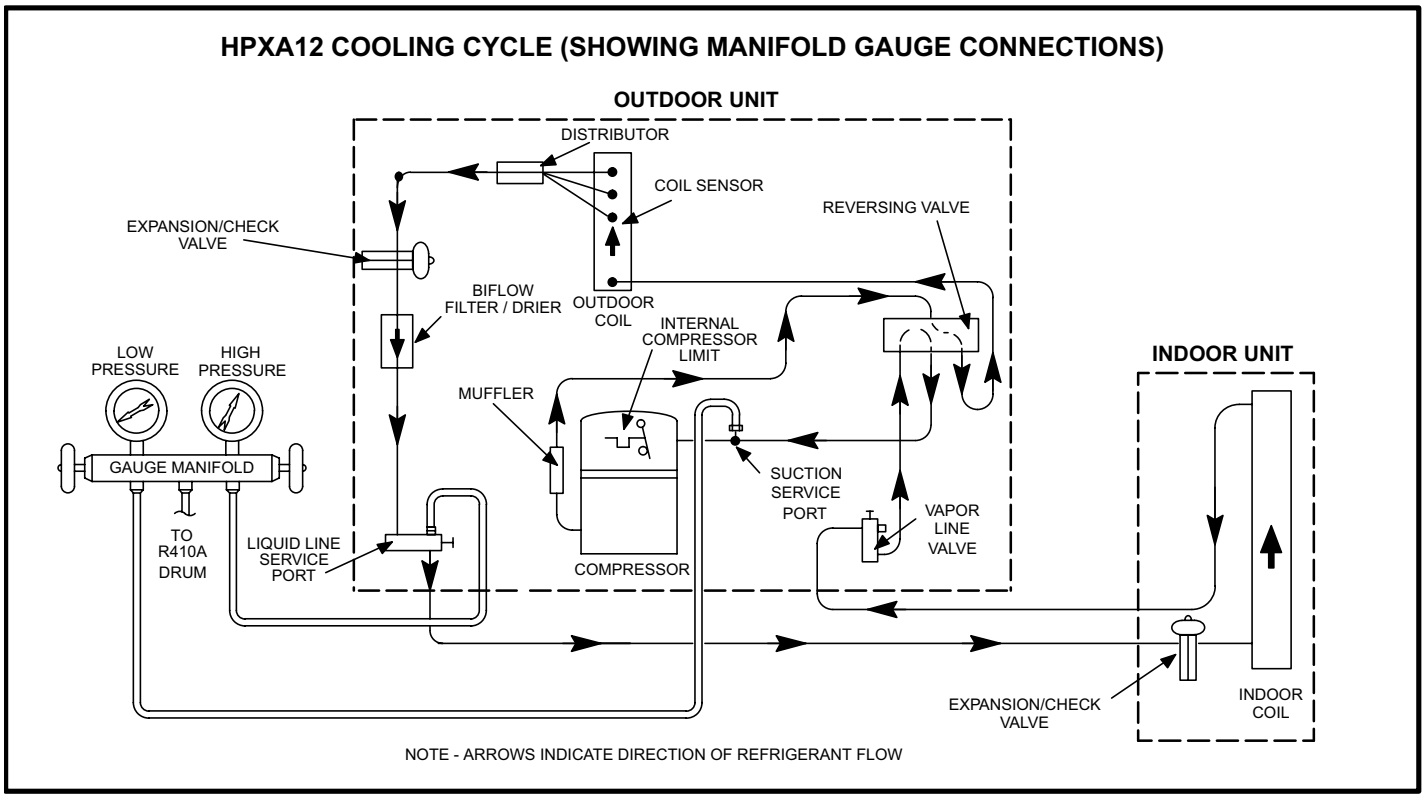


FIGURE 12

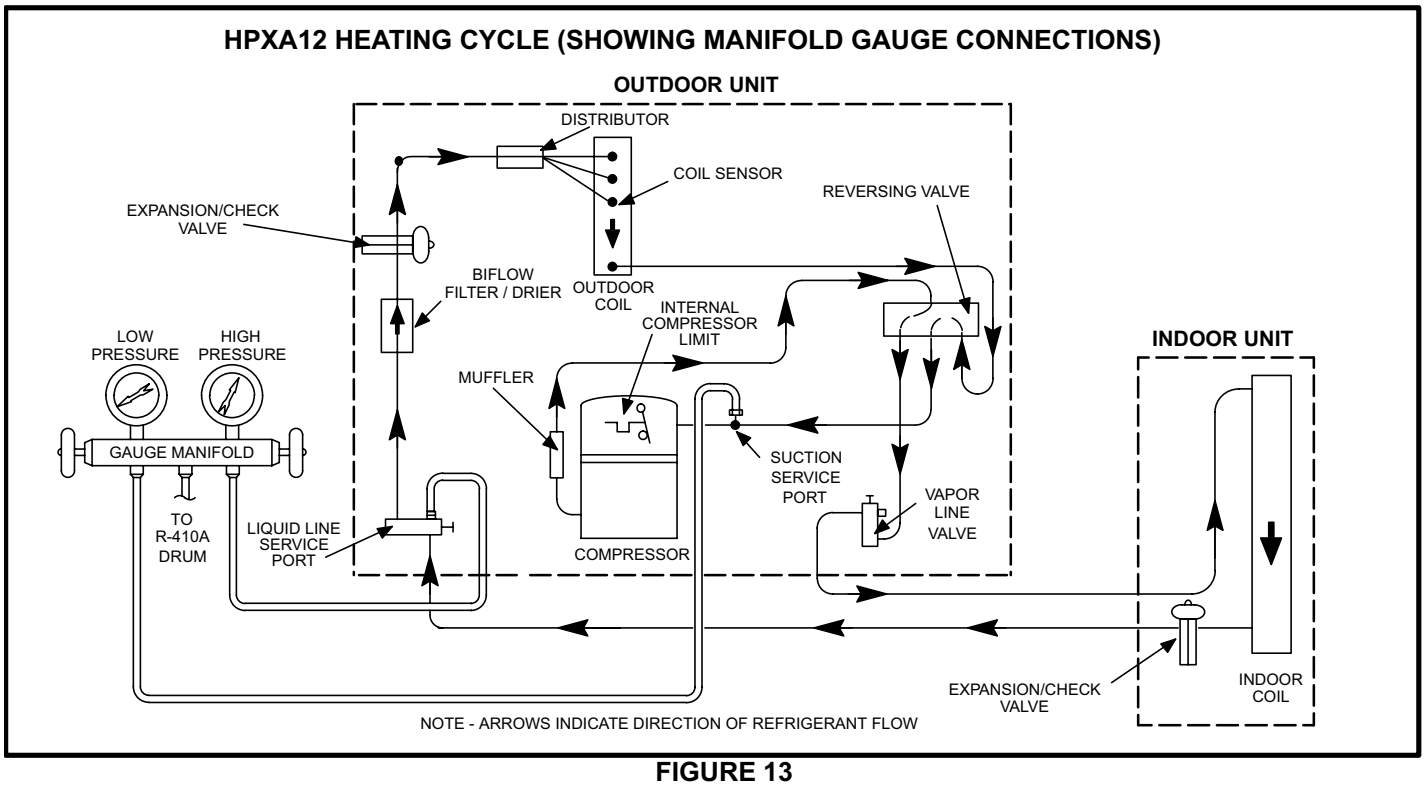


FIGURE 13

A - Plumbing

Field refrigerant piping consists of liquid and vapor lines from the outdoor unit (sweat connections). Use Lennox L15 (sweat) series line sets as shown in table 3.

TABLE 3

HPXA12 UNIT	LIQUID LINE	VAPOR LINE	L10/15 LINE SETS
-18 -24 -30	3/8 in. (10 mm)	3/4 in. (19 mm)	L15-41 20 ft. - 50 ft. (6 m - 15 m)
-36 -42	3/8 in. (10 mm)	7/8 in. (22 mm)	L15-65 30 ft. - 50 ft. 9 m - 15 m)
-48 -60	3/8 in. (10 mm)	1-1/8 in. (29 mm)	FIELD FABRICATED

B - Service Valves

The liquid line and vapor line service valves (figures 14 and 15) and gauge ports are accessible from the outside of the unit. Use the service ports for leak testing, evacuating, charging and checking charge.

Each valve is equipped with a service port which has a factory-installed Schrader valve. A service port cap protects the Schrader valve from contamination and serves as the primary leak seal.

To Access Schrader Port:

1 - Remove service port cap with an adjustable wrench.
2 - Connect gauge to the service port.
3 - When testing is complete, replace service port cap. Tighten finger tight, then an additional 1/6 turn.

To Open Service Valve:

1 - Remove the stem cap with an adjustable wrench.
2 - Use a service wrench with a hex-head extension to back the stem out counterclockwise as far as it will go. *NOTE - Use a 3/16" hex head extension for 3/8" line sizes or a 5/16" extension for large line sizes.*
3 - Replace the stem cap. Tighten finger tight, then tighten an additional 1/6 turn.

To Close Service Valve:

1 - Remove the stem cap with an adjustable wrench.
2 - Use a service wrench with a hex-head extension to turn the stem clockwise to seat the valve. Tighten the stem firmly.
NOTE - Use a 3/16" hex head extension for 3/8" line sizes or a 5/16" extension for large line sizes.
3 - Replace the stem cap. Tighten finger tight, then tighten an additional 1/6 turn.

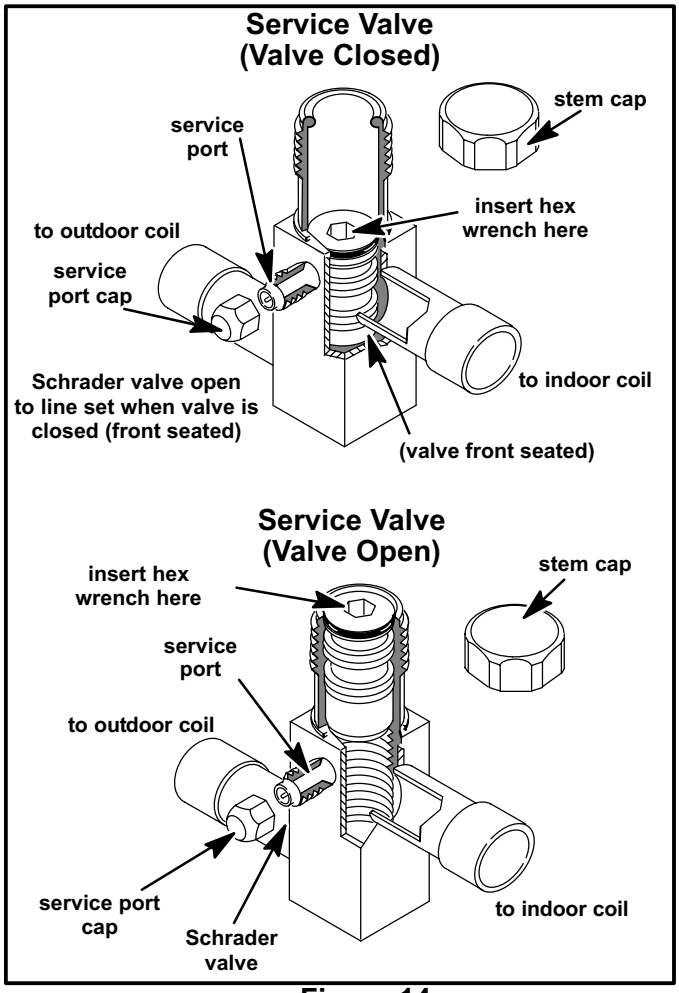


Figure 14

Vapor Line Ball Valve – All Units

Vapor line service valves function the same way as the other valves, the difference is in the construction. These valves are not rebuildable. If a valve has failed, you must replace it. A ball valve is illustrated in figure 15.

The ball valve is equipped with a service port with a factory-installed Schrader valve. A service port cap protects the Schrader valve from contamination and assures a leak-free seal.

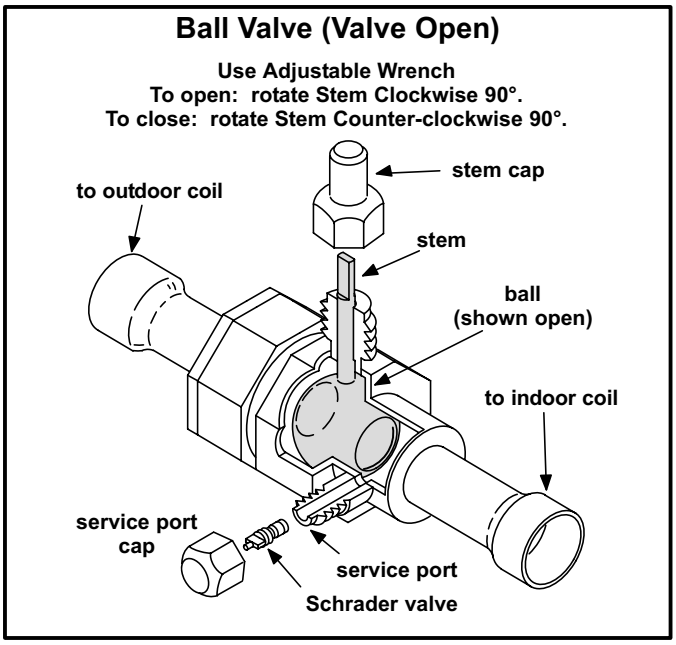


Figure 15

IV - CHARGING

A - Leak Testing

After the line set has been connected to the indoor and outdoor units, check the line set connections and indoor unit for leaks.

⚠ WARNING

Refrigerant can be harmful if it is inhaled. Refrigerant must be used and recovered responsibly.

Failure to follow this warning may result in personal injury or death.

⚠WARNING

Danger of explosion: Can cause equipment damage, injury or death. Never use oxygen to pressurize a refrigeration or air conditioning system. Oxygen will explode on contact with oil and could cause personal injury.

⚠ WARNING

Danger of explosion: Can cause equipment damage, injury or death. When using a high pressure gas such as dry nitrogen to pressurize a refrigeration or air conditioning system, use a regulator that can control the pressure down to 1 or 2 psig (6.9 to 13.8 kPa).

Using an Electronic Leak Detector or Halide

1 - Connect a cylinder of R410A to the center port of the manifold gauge set.

2 - With both manifold valves closed, open the valve on the R410A cylinder (vapor only).

3 - Open the high pressure side of the manifold to allow the R410A into the line set and indoor unit. Weigh in a trace amount of HCFC-22. [A trace amount is a maximum of 2 ounces (57 g) or 3 pounds (31 kPa) pressure.] Close the valve on the R410A cylinder and the valve on the high pressure side of the manifold gauge set. Disconnect the R410A cylinder.

4 - Connect a cylinder of nitrogen with a pressure regulating valve to the center port of the manifold gauge set.

5 - Connect the manifold gauge set high pressure hose to the vapor valve service port. *(Normally, the high pressure hose is connected to the liquid line port; however, connecting it to the vapor port better protects the manifold gauge set from high pressure damage.)*

6 - Adjust the nitrogen pressure to 150 psig (1034 kPa). Open the valve on the high side of the manifold gauge set which will pressurize line set and indoor unit.

7 - After a few minutes, open a refrigerant port to ensure the refrigerant you added is adequate to be detected. (Amounts of refrigerant will vary with line lengths.) Check all joints for leaks. Purge nitrogen and R410A mixture. Correct any leaks and recheck.

B - Evacuating the System

Evacuating the system of noncondensables is critical for proper operation of the unit. Noncondensables are defined as any gas that will not condense under temperatures and pressures present during operation of an air conditioning system. Noncondensables and water vapor combine with refrigerant to produce substances that corrode copper piping and compressor parts.

NOTE - This evacuation process is adequate for a new installation with clean and dry lines. If excessive moisture is present, the evacuation process may be required more than once.

⚠ IMPORTANT

Use a thermocouple or thermistor electronic vacuum gauge that is calibrated in microns. Use an instrument that reads from 50 microns to at least 10,000 microns.

1 - Connect manifold gauge set to the service valve ports :
- low pressure gauge to *vapor* line service valve
- high pressure gauge to *liquid* line service valve

2 - Connect micron gauge.

3 - Connect the vacuum pump (with vacuum gauge) to the center port of the manifold gauge set.

4 - Open both manifold valves and start the vacuum pump.

5 - Evacuate the line set and indoor unit to an **absolute pressure** of 23,000 microns (29.01 inches of mercury). During the early stages of evacuation, it is desirable to close the manifold gauge valve at least once to determine if there is a rapid rise in **absolute pressure**. A rapid rise in pressure indicates a relatively large leak. If this occurs, repeat the leak testing procedure.

*NOTE - The term **absolute pressure** means the total actual pressure within a given volume or system, above the absolute zero of pressure. Absolute pressure in a vacuum is equal to atmospheric pressure minus vacuum pressure.*

6 - When the absolute pressure reaches 23,000 microns (29.01 inches of mercury), close the manifold gauge valves, turn off the vacuum pump and disconnect the manifold gauge center port hose from vacuum pump. Attach the manifold center port hose to a nitrogen cylinder with pressure regulator set to 150 psig (1034 kPa) and purge the hose. Open the manifold gauge valves to break the vacuum in the line set and indoor unit. Close the manifold gauge valves.

⚠ CAUTION

Danger of Equipment Damage.
Avoid deep vacuum operation. Do not use compressors to evacuate a system.
Extremely low vacuums can cause internal arcing and compressor failure.
Damage caused by deep vacuum operation will void warranty.

7 - Shut off the nitrogen cylinder and remove the manifold gauge hose from the cylinder. Open the manifold gauge valves to release the nitrogen from the line set and indoor unit.

8 - Reconnect the manifold gauge to the vacuum pump, turn the pump on, and continue to evacuate the line set and indoor unit until the absolute pressure does not rise above 500 microns (29.9 inches of mercury) within a 20-minute period after shutting off the vacuum pump and closing the manifold gauge valves.

9 - When the absolute pressure requirement above has been met, disconnect the manifold hose from the vacuum pump and connect it to an upright cylinder of R410A refrigerant. Open the manifold gauge valves to break the vacuum from 1 to 2 psig positive pressure in the line set and indoor unit. Close manifold gauge valves and shut off the R410A cylinder and remove the manifold gauge set.

C - Charging

⚠ WARNING

Refrigerant can be harmful if inhaled. Refrigerant must be used and recovered responsibly. Failure to follow this warning can lead to injury or death.

Units are factory charged with the amount of R410A refrigerant indicated on the unit rating plate. This charge is based on a matching indoor coil and outdoor coil with 15 ft. (4.5m) line set. See table 4 for varying lengths of line set and charge adjustment. The check/expansion valve provided with the unit is approved for use with R410A. Do not replace it with a valve designed for use with R22. This unit is NOT approved for use with coils which include metering orifices or capillary tubes.

TABLE 4

Liquid Line Set Diameter	Oz. per 5 ft. (grams per 1.5 m) adjust from 15 ft. (4.5 m) line set*
3/8 in. (10 mm)	3 ounces per 5 feet (85g per 1.5 m)

**If line length is greater than 15 ft. (4.5 m), add this amount. If line length is less than 15 ft. (4.5 m), subtract this amount.*

Units are designed for line sets up to 50 feet (15.2 m). Consult Lennox Refrigeration Piping Manual for line sets over 50 feet (15.2 m).

⚠ IMPORTANT

Mineral oils are not compatible with R410A. If oil must be added, it must be a polyol ester oil.

The outdoor unit should be charged during warm weather. However, applications arise in which charging must occur in the colder months. *The method of charging is determined by the unit's **refrigerant metering device** and the **outdoor ambient temperature**.*

Measure the liquid line temperature and the outdoor ambient temperature as outlined below:

1 - Connect the manifold gauge set to the service valves:
- low pressure gauge to *vapor* valve service port
- high pressure gauge to *liquid* valve service port

Connect the center manifold hose to an upright cylinder of R410A. Close manifold gauge set valves.

2 - Set the room thermostat to call for heat. This will create the necessary load for properly charging the system in the cooling cycle.

3 - Use a digital thermometer to record the outdoor ambient temperature.

4 - When the heating demand has been satisfied, switch the thermostat to cooling mode with a set point of 68°F (20°C). When pressures have stabilized, use a digital thermometer to record the liquid line temperature.

5 - The outdoor temperature will determine which charging method to use. Proceed with the appropriate charging procedure.

If the system is completely void of refrigerant, the recommended and most accurate method of charging is to weigh the refrigerant into the unit according to the total amount shown on the unit nameplate.

If weighing facilities are not available or if unit is just low on charge, use the following procedure:

1 - Connect gauge manifold as shown in figure 12. Connect an R410A drum to center port of gauge manifold.

2 - Record outdoor ambient temperature using a digital thermometer.

3 - Set room thermostat to 74°F (23°C) in “Emergency Heat” or “Heat” position and allow unit to run until heating demand is satisfied. This will create the necessary load for proper charging of system in cooling cycle. Change thermostat setting to 68°F (20°C) in “Cool” position. Allow unit to run until system pressures stabilize.

4 - Use the same digital thermometer used to check outdoor ambient temperature to check liquid line temperature.

5 - If outdoor temperature is 60°F (15°C) or above, use the approach method to check the refrigerant charge. The difference between ambient and liquid line temperatures should match values given in table 5. Refrigerant must be added to lower approach temperature. Remove refrigerant from system to increase approach temperature.

TABLE 5

Model Number	Approach Temperature Liquid Line Temp. - Outdoor Ambient °F (°C)
HPXA12-18	5 (2.8)
HPXA12-24	8.0 (4.4)
HPXA12-30	12.5 (6.9)
HPXA12-36	13 (7.2)
HPXA12-42	13 (7.2)
HPXA12-48	8.5 (4.7)
HPXA12-60	12 (6.7)

6 - If ambient temperature is less than 60°F (15°C), air flow might need to be restricted to achieve pressures in the 300-350 psig (2068-2413 kPa) range. See figure 16. These higher pressures are necessary for checking charge. Block equal sections of air intake panels, moving obstructions sideways as shown until liquid pressure is in the 300-350 psig (2068-2413 kPa) range.

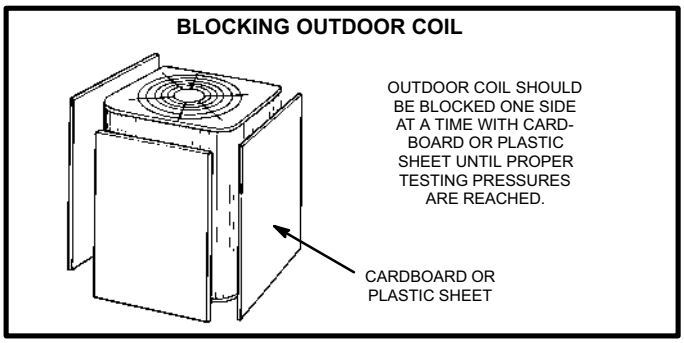


FIGURE 16

TABLE 6

Model Number	Subcooling Values Conversion Temp. - Liquid Line Temp. °F (°C)
HPXA12-18	8.5 (4.7)
HPXA12-24	12.5 (6.9)
HPXA12-30	5.5 (3.1)
HPXA12-36	8.5 (4.7)
HPXA12-42	8.5 (4.7)
HPXA12-48	7 (3.9)
HPXA12-60	7 (3.9)

7 - Read liquid line temperature. Read liquid line pressure from gauge and convert to heat pump temperature using the temperature/pressure chart for R410A refrigerant provided in table 8. The difference between the liquid line temperature and the conversion temperature is the subcooling temperature (subcooling = conversion temperature minus liquid temperature). Subcooling should approximate values given in table 6. Add refrigerant to increase subcooling and remove refrigerant to reduce subcooling. Be aware of the R410A refrigerant cylinder. It will be light maroon-colored. Refrigerant should be added through the vapor line valve in the liquid state. **Some R410A cylinders are equipped with a dip tube which allows you to draw liquid refrigerant from the bottom of the cylinder without turning the cylinder upside-down. The cylinder will be marked if it is equipped with a dip tube.**

8 - Use table 7 as a general guide when performing maintenance checks. This is not a procedure for charging unit. Minor variations in these pressures may be expected due to differences in installations. Significant differences could mean that the system is not properly charged or that a problem exists with some component in the system. Used carefully, this table could serve as a useful service guide.

TABLE 7
NORMAL OPERATING PRESSURES

Cooling Operation														
Outdoor Coil Entering Air Temp. °F (°C)	HPXA12-18		HPXA12-24		HPXA12-30		HPXA12-36		HPXA12-42		HPXA12-48		HPXA12-60	
	Liquid	Vapor	Liquid	Suction	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor
65 (18.3)	223	147	254	130	244	136	262	135	260	133	240	126	250	123
75 (23.9)	270	149	290	134	282	139	304	138	300	135	280	130	300	132
85 (29.4)	312	150	335	137	325	141	349	141	345	137	320	134	345	137
95 (35.0)	360	152	382	140	375	143	399	143	397	139	360	136	378	140
105 (40.6)	406	154	433	143	426	145	454	146	452	142	415	137	430	142
115 (46.1)	463	155	490	146	485	147	514	149	510	145	470	139	497	145
Heating Operation														
Outdoor Coil Entering Air Temp. °F (°C)	HPXA12-18		HPXA12-24		HPXA12-30		HPXA12-36		HPXA12-42		HPXA12-48		HPXA12-60	
	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor
20 (-6.6)	265	63	295	59	340	60	278	59	288	60	315	60	282	57
30 (-1.1)	280	78	315	72	350	75	290	72	297	70	325	74	300	70
40 (4.4)	294	96	335	87	362	90	305	89	310	85	340	90	310	82
50 (10.0)	310	112	350	103	374	110	317	105	325	105	360	106	325	92
60 (15.5)	320	133	375	120	390	132	333	128	344	127	380	128	335	100

TABLE 8
R410A Temperature/Pressure Chart

Temperature °F	Pressure Psig	Temperature °F	Pressure Psig	Temperature °F	Pressure Psig	Temperature °F	Pressure Psig
32	100.8	63	178.5	94	290.8	125	445.9
33	102.9	64	181.6	95	295.1	126	451.8
34	105.0	65	184.3	96	299.4	127	457.6
35	107.1	66	187.7	97	303.8	128	463.5
36	109.2	67	190.9	98	308.2	129	469.5
37	111.4	68	194.1	99	312.7	130	475.6
38	113.6	69	197.3	100	317.2	131	481.6
39	115.8	70	200.6	101	321.8	132	487.8
40	118.0	71	203.9	102	326.4	133	494.0
41	120.3	72	207.2	103	331.0	134	500.2
42	122.6	73	210.6	104	335.7	135	506.5
43	125.0	74	214.0	105	340.5	136	512.9
44	127.3	75	217.4	106	345.3	137	519.3
45	129.7	76	220.9	107	350.1	138	525.8
46	132.2	77	224.4	108	355.0	139	532.4
47	134.6	78	228.0	109	360.0	140	539.0
48	137.1	79	231.6	110	365.0	141	545.6
49	139.6	80	235.3	111	370.0	142	552.3
50	142.2	81	239.0	112	375.1	143	559.1
51	144.8	82	242.7	113	380.2	144	565.9
52	147.4	83	246.5	114	385.4	145	572.8
53	150.1	84	250.3	115	390.7	146	579.8
54	152.8	85	254.1	116	396.0	147	586.8
55	155.5	86	258.0	117	401.3	148	593.8
56	158.2	87	262.0	118	406.7	149	601.0
57	161.0	88	266.0	119	412.2	150	608.1
58	163.9	89	270.0	120	417.7	151	615.4
59	166.7	90	274.1	121	423.2	152	622.7
60	169.6	91	278.2	122	428.8	153	630.1
61	172.6	92	282.3	123	434.5	154	637.5
62	195.5	93	286.5	124	440.2	155	645.0

V - SERVICE AND RECOVERY

⚠WARNING

Polyol ester (POE) oils used with R410A refrigerant absorb moisture very quickly. It is very important that the refrigerant system be kept closed as much as possible. DO NOT remove line set caps or service valve stub caps until you are ready to make connections.

⚠ IMPORTANT

Use recovery machine rated for R410 refrigerant.

If the HPXA12 system must be opened for any kind of service, such as compressor or drier replacement, you must take extra precautions to prevent moisture from entering the system. The following steps will help to minimize the amount of moisture that enters the system during recovery of R410A.

1 - Use a regulator-equipped nitrogen cylinder to break the system vacuum. Do not exceed 5 psi. The dry nitrogen will fill the system, and will help purge any moisture.

2 - Remove the faulty component and quickly seal the system (using tape or some other means) to prevent additional moisture from entering the system.

3 - Do not remove the tape until you are ready to install new component. Quickly install the replacement component.

4 - Evacuate the system to remove any moisture and other non-condensables.

The HPXA12 system MUST be checked for moisture any time the sealed system is opened.

Any moisture not absorbed by the polyol ester oil can be removed by triple evacuation. Moisture that has been absorbed by the compressor oil can be removed by replacing the drier.

⚠ IMPORTANT

Evacuation of system only will not remove moisture from oil. Drier must be replaced to eliminate moisture from POE oil.

VI - MAINTENANCE

In order to maintain the warranty on this equipment, the HPXA12 system must be serviced annually and a record of service maintained. The following should be checked between annual maintenance:

A - Outdoor Unit

1 - Clean and inspect the outdoor coil. The coil may be flushed with a water hose. Ensure the power is turned off before you clean the coil.

2 - Condenser fan motor is prelubricated and sealed. No further lubrication is needed.

3 - Visually inspect connecting lines and coils for evidence of oil leaks.

4 - Check wiring for loose connections.

5 - Check for correct voltage at unit (unit operating).

6 - Check amp-draw condenser fan motor.
Unit nameplate _____ Actual _____ .

NOTE - If owner complains of insufficient cooling, the unit should be gauged and refrigerant charge checked. Refer to section on refrigerant charging in this instruction.

1 - Clean and inspect condenser coil. (Coil may be flushed with a water hose after disconnecting power).

2 - Visually inspect all connecting lines, joints and coils for evidence of oil leaks.

B - Indoor Coil

1 - Clean coil, if necessary.

2 - Check connecting lines and coils for evidence of oil leaks.

3 - Check the condensate line and clean it if necessary.

C - Indoor Unit

1 - Clean or change filters.

2 - Adjust blower speed for cooling. Measure the pressure drop over the coil to determine the correct blower CFM. Refer to the unit information service manual for pressure drop tables and procedure.

3 - *Belt Drive Blowers* - Check belt for wear and proper tension.

4 - Check all wiring for loose connections

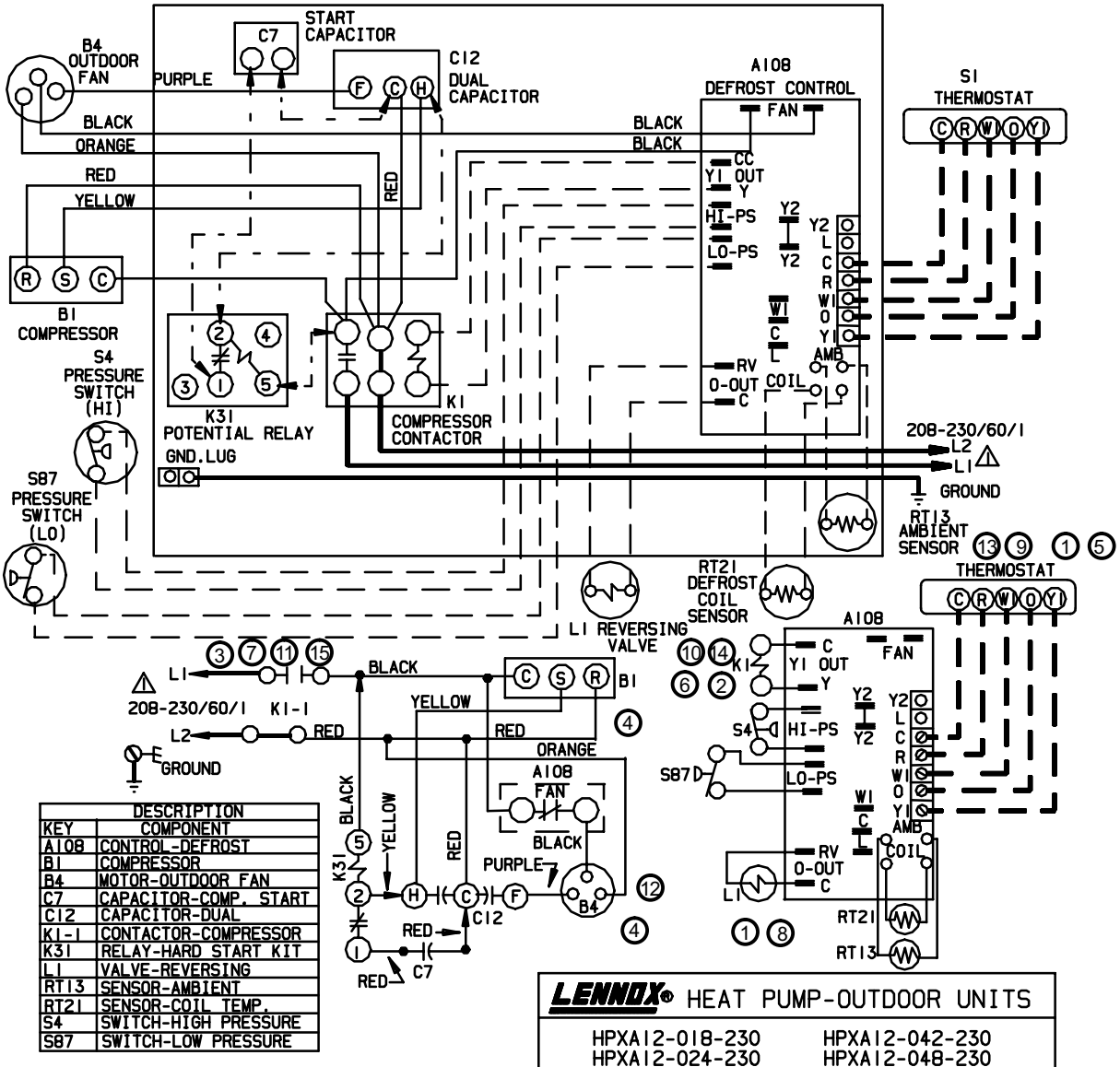
5 - Check for correct voltage at unit (blower operating).

6 - Check amp-draw on blower motor
Unit nameplate_____ Actual _____.

VII - WIRING DIAGRAM AND SEQUENCE OF OPERATION

HPXA12 1.5 THROUGH 5 TON UNIT WIRING

Single Phase 230V



DESCRIPTION	
KEY	COMPONENT
A108	CONTROL-DEFROST
B1	COMPRESSOR
B4	MOTOR-OUTDOOR FAN
C7	CAPACITOR-COMP. START
C12	CAPACITOR-DUAL
K1-1	CONTACTOR-COMPRESSOR
K31	RELAY-HARD START KIT
L1	VALVE-REVERSING
RT13	SENSOR-AMBIENT
RT21	SENSOR-COIL TEMP.
S4	SWITCH-HIGH PRESSURE
S87	SWITCH-LOW PRESSURE

LINE VOLTAGE FIELD INSTALLED

CLASS II VOLTAGE FIELD INSTALLED

OPTIONAL COMPONENT WIRING

⚠ NOTE- FOR USE WITH COPPER CONDUCTORS ONLY. REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVER-CURRENT PROTECTION SIZE.

WARNING- ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

LENNOX® HEAT PUMP-OUTDOOR UNITS

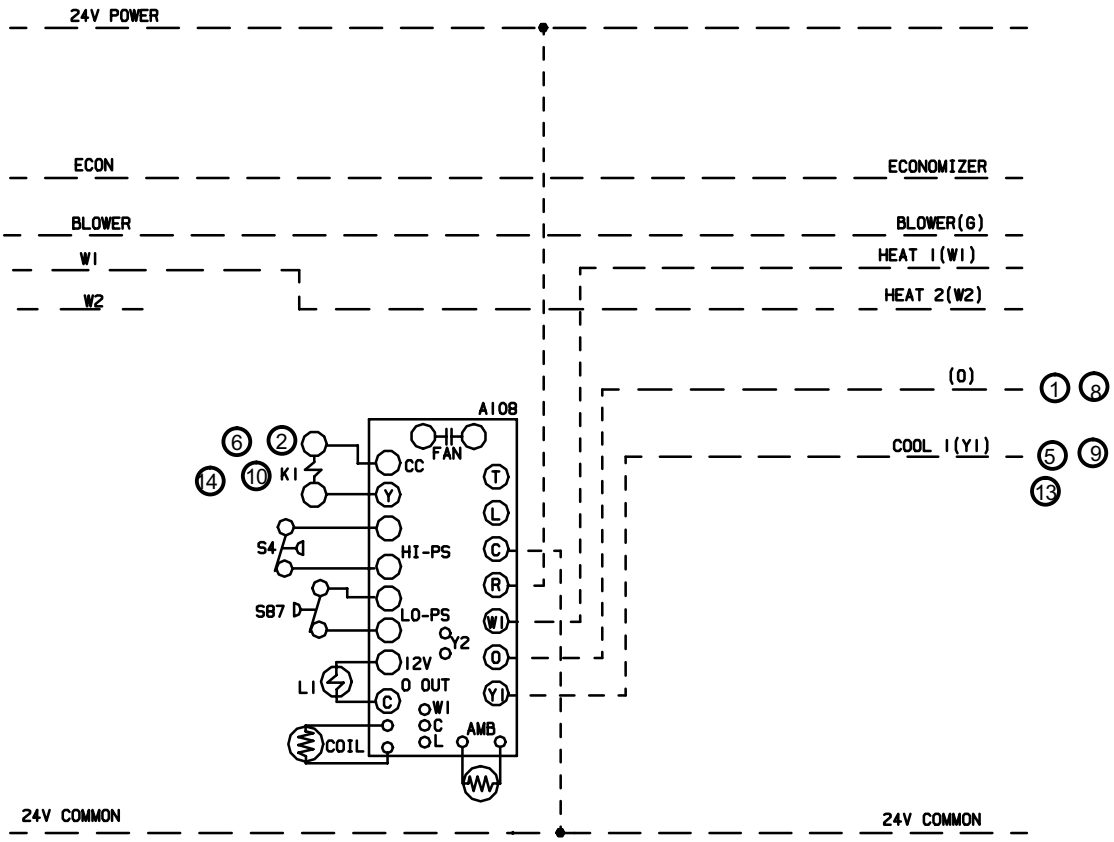
HPXA12-018-230	HPXA12-042-230
HPXA12-024-230	HPXA12-048-230
HPXA12-030-230	HPXA12-060-230
HPXA12-036-230	

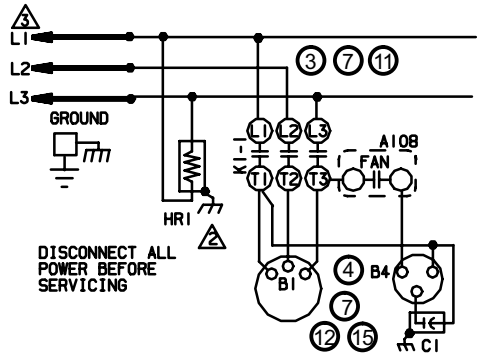
0603	Supersedes Form No. 533,479W
	New Form No. 534,232W

Litho U.S.A.

HPXA12 3 THROUGH 5 TON UNIT WIRING

Three Phase 230V





KEY	DESCRIPTION COMPONENT
A108	TIMER-DEFROST,COMPRESSOR 1
B1	COMPRESSOR 1
B4	MOTOR-OUTDOOR FAN 1
C1	CAPACITOR-OUTDOOR FAN 1
HR1	HEATER-COMPRESSOR
K1,-1	CONTACTOR-COMPRESSOR 1
L1	VALVE-REVERSING
S4	SWITCH-LIMIT,HI PRESS COMP 1
S87	SWITCH-LOW PRESS,COMP 1

DENOTES OPTIONAL COMPONENT CONNECTIONS

1. REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.
2. FACTORY INSTALLED ON 048, AND 060 UNITS ONLY

IF ANY WIRE IN THIS APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING,INSULATION THICKNESS AND TERMINATION

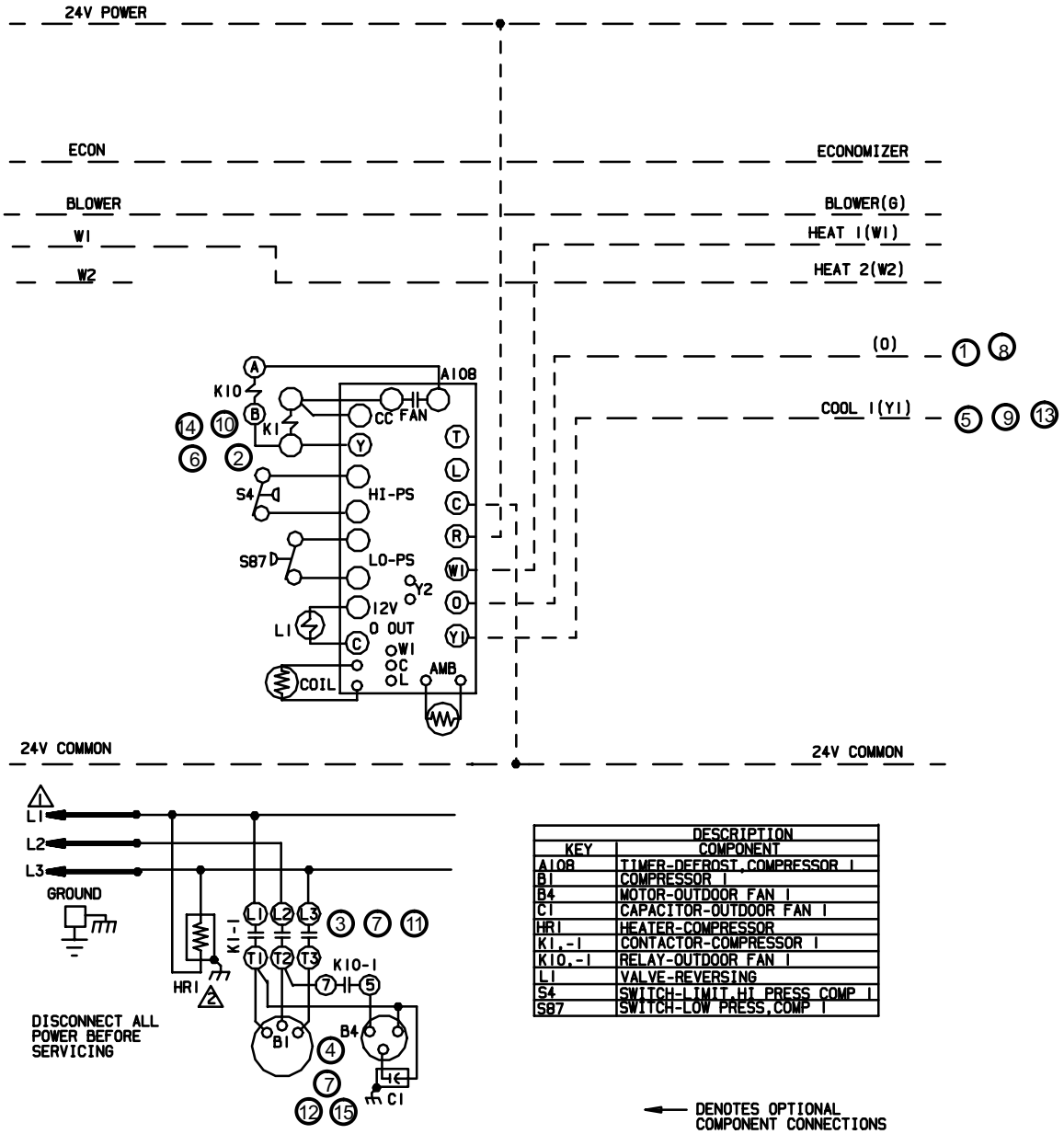
WARNING-
ELECTRIC SHOCK HAZARD,CAN CAUSE INJURY OR DEATH.UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

HEAT PUMP- OUTDOOR UNITS	
HPXA12-036,048,060-233-01	
HEAT PUMP SECTION-B4	
1003	Supersedes
	New Form No. 534,533W

 Litho U.S.A.

HPXA12 3 THROUGH 5 TON UNIT WIRING

Three Phase 460V



KEY	DESCRIPTION COMPONENT
A108	TIMER-DEFROST,COMPRESSOR 1
B1	COMPRESSOR 1
B4	MOTOR-OUTDOOR FAN 1
C1	CAPACITOR-OUTDOOR FAN 1
HR1	HEATER-COMPRESSOR
K1,-1	CONTACTOR-COMPRESSOR 1
K10,-1	RELAY-OUTDOOR FAN 1
L1	VALVE-REVERSING
S4	SWITCH-LIMIT,HI PRESS COMP 1
S87	SWITCH-LOW PRESS,COMP 1

← DENOTES OPTIONAL COMPONENT CONNECTIONS

⚠ REFER TO UNIT RATING PLATE FOR MINIMUM CIRCUIT AMPACITY AND MAXIMUM OVERCURRENT PROTECTION SIZE.

⚠2 FACTORY INSTALLED ON 048, AND 060 UNITS ONLY

IF ANY WIRE IN THIS APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING,INSULATION THICKNESS AND TERMINATION

WARNING-
ELECTRIC SHOCK HAZARD,CAN CAUSE INJURY OR DEATH.UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

HEAT PUMP- OUTDOOR UNITS	
HPXA12-036,048,060-463-01	
HEAT PUMP SECTION-B4	
1003	Supersedes
	New Form No. 534,532W

 Litho U.S.A.

HPXA12 1.5 THROUGH 5 TON OPERATING SEQUENCE
Single and Three Phase

This is the sequence of operation for HPXA12 series units. The sequence is outlined by numbered steps which correspond to circled numbers on the adjacent diagram.

NOTE- The thermostat used may be electromechanical or electronic.

NOTE- Transformer in indoor unit supplies power (24 VAC) to the thermostat and outdoor unit controls.

COOLING:

1 - Internal thermostat wiring energizes terminal O by cooling mode selection, energizing the reversing valve L1. Cooling demand initiates at Y1 in the thermostat.

2 - 24VAC energizes compressor contactor K1 (5 minute anti-cylce time must be satisfied first) .

3 - K1-1 N.O. closes, energizing compressor (B1) and outdoor fan motor (B4).
460V units only - K1-1 closes energizing compressor (B1) and outdoor relay K10 energizing outdoor fan motor (B4).

4 - Compressor (B1) and outdoor fan motor (B4) begin immediate operation.

END OF COOLING DEMAND:

5 - Cooling demand is satisfied. Terminal Y1 is de-energized.

6 - Compressor contactor K1 is de-energized.

7 - K1-1 opens and compressor (B1) and outdoor fan motor (B4) are de-energized and stop immediately.
460V units only - K1-1 opens de-energizing compressor (B1) and outdoor relay K10 . Outdoor fan (B4) is de-energized.

8 - Terminal O is de-energized when internal thermostat is out of cooling mode, de-energizing the reversing valve L1.

FIRST STAGE HEAT:

9 - Heating demand initiates at Y1.

10 - 24VAC energizes compressor contactor K1 (5 minute anti-cylce time must be satisfied first).

11 - K1-1 N.O. closes, energizing compressor and outdoor fan motor.
460V units only - K1-1 closes energizing compressor (B1) and outdoor relay K10 energizing outdoor fan motor (B4).

12 - Compressor (B1) and outdoor fan motor (B4) begin immediate operation.

END OF FIRST STAGE HEAT:

13 - Heating demand is satisfied. Terminal Y1 is de-energized.

14 - Compressor contactor K1 is de-energized.

15 - K1-1 opens and compressor (B1) and outdoor fan motor (B4) are de-energized and stop immediately.
460V units only - K1-1 opens de-energizing compressor (B1) and outdoor relay K10 . Outdoor fan (B4) is de-energized.

DEFROST MODE:

16 - When a defrost cycle is initiated, the control energizes the reversing valve solenoid and turns off the condenser fan. The control will also put 24VAC on the “W1” (auxiliary heat) line. The unit will stay in this mode until either the coil sensor temperature is above the selected termination temperature, the defrost time of 14 minutes has been completed, or the room thermostat demand cycle has been satisfied. (If the temperature select shunt is not installed, the default termination temperature will be 100°F.) If the room thermostat demand cycle terminates the cycle, the defrost cycle will be held until the next room thermostat demand cycle. If the coil sensor temperature is still below the selected termination temperature, the control will continue the defrost cycle until the cycle is terminated in one of the methods mentioned above. If a defrost is terminated by time and the coil temperature did not remain above 35°F (2°C) for 4 minutes, the control will go to the 34-minute Time/Temperature mode.